S699-5-F

Lifestyle and Health

Behavioral Health Risks Among Rhode Islanders
An Overview, 1987-1988

December 1989

Number of Rhode Islanders at Risk
(ages 18 or older)

RISK FACTOR	NUMBER
Sedentary Lifestyle	494,000
Seatbelts	369,000
Cigarette Smoking	180,000
Obesity	158,000
Acute Drinking	60,000
Chronic Drinking	47,000
Drinking & Driving	16,000
Uncontrolled Hypertension	12,000

The Rhode Island Department of Health conducts a monthly telephone survey on the health risk behaviors of Rhode Islanders. This ongoing project is part of a national monitoring program coordinated by the Centers for Disease Control. This report highlights Rhode Island's health risks based on 3,550 interviews conducted during 1987 and 1988.

A Report by the Rhode Island Department of Health · Office of Health Promotion

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INTRODUCTION

This report presents an overview of findings from the Rhode Island Behavioral Risk Factor Surveillance System (BRFSS) for 1987 and 1988. This telephone survey is conducted by the Office of Health Promotion, RI Department of Health. Rhode Island has participated in this partially federally-funded project with the Centers for Disease Control since 1984. Currently 40 states and the District of Columbia, comprising three-fourths of the U.S. population, are involved. Each month 150 random-digit dialing telephone interviews are completed using a standard questionnaire that was designed by CDC. Combining data from 1987 and 1988 yielded a sample of 3,550 completed interviews. See the Appendix for a brief history of Rhode Island's involvement and the methodology used in this survey.

The purpose of the BRFSS system is to gather information on behaviors and conditions related to health risks. Each randomly-selected BRFSS respondent is asked to report on his/her own behavior. This process yields a dataset that contains high quality, self-reported behavioral data.

The BRFSS questionnaire captures data on the following lifestyles or health risk behaviors:

- seatbelt usage
- uncontrolled hypertension
- sedentary lifestyle
- obesity
- smoking
- acute and chronic drinking
- drinking and driving.

Additionally, basic demographic information, such as age, gender, race, education, and household income, is collected.

In the months to follow, further analyses will be presented on: trends in health risk behaviors of Rhode Islanders over the last four years, comparisons of findings on adult Rhode Island residents with those from other participating states, and a series of topical reports on specific health risk behaviors.

DEMOGRAPHICS

When demographic characteristics of the 1987-88 sample are compared with those of the adult Rhode Island population (see Table 1), some differences emerge. For example, the respondents within the 18-24 age cohort were underrepresented (11% compared with 17%); while those ages 65 and older were slightly overrepresented. Also, females were slightly overrepresented (5% more than expected). The ratio of whites to nonwhites was close to the population values. In the analyses, these age and gender differences are adjusted through a weighting procedure.

Table 1

Demographic Characteristics of Respondents Compared with Rhode Islanders 18 Years of Age or Older

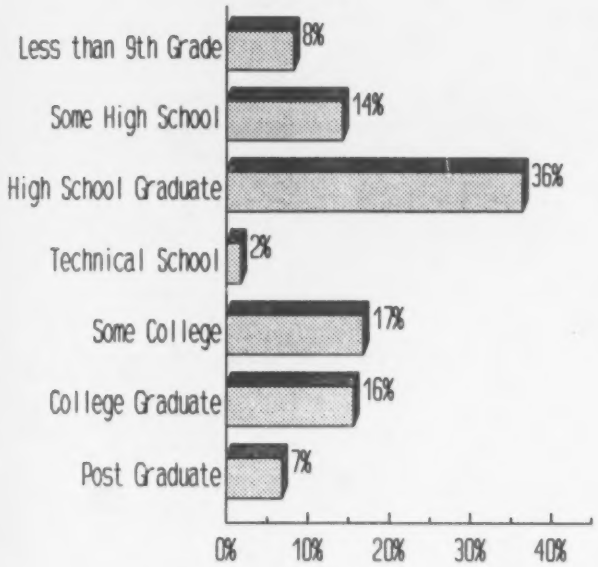
	Respondents		Population	
AGE:	%	n	%	n
18-24	11.3	400	17.0	126,100
25-34	22.7	806	21.4	158,600
35-44	18.4	654	16.6	123,000
45-54	10.8	384	11.8	87,200
55-64	13.7	486	14.0	103,800
65+	23.1	820	19.1	141,400
RACE:				
White	95.2	3,381	95.0	702,900
Nonwhite	4.8	169	5.0	37,200
GENDER:				
Male	41.5	1,472	46.4	343,600
Female	58.5	2,078	53.6	396,500
TOTAL		3,350		740,100

Educational levels of respondents, as summarized in Figure 1 (on the next page), reveal that twenty-two percent did not finish high school. The largest group, 36 percent of the sample, had graduated from high school. Furthermore, 40 percent of the sample had some college education.

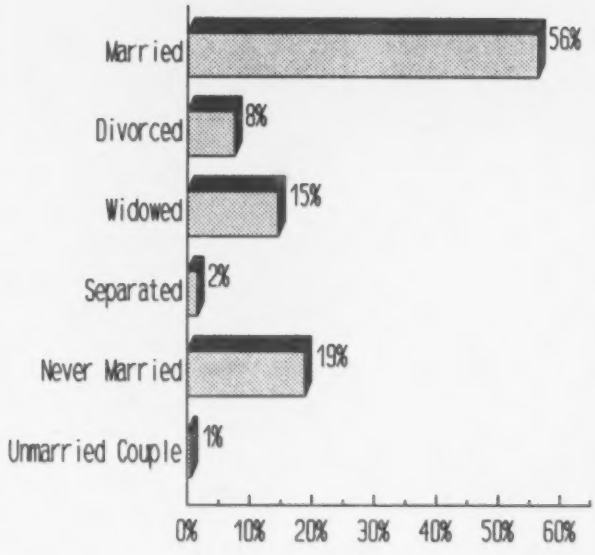
The majority of the respondents was both married and employed. Additionally, the question on income, not surprisingly, had the highest refusal rate (45 percent). Among those who did answer this question, over 68% had household incomes above twenty thousand dollars.

Figure 1
DEMOGRAPHIC SUMMARY
RHODE ISLAND BEHAVIORAL RISK FACTOR RESPONDENTS
1987-1988

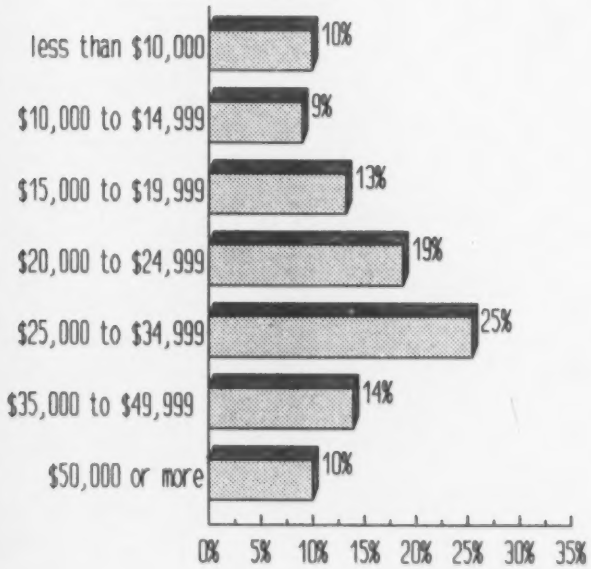
Educational Level



Marital Status



Household Income



Employment Status

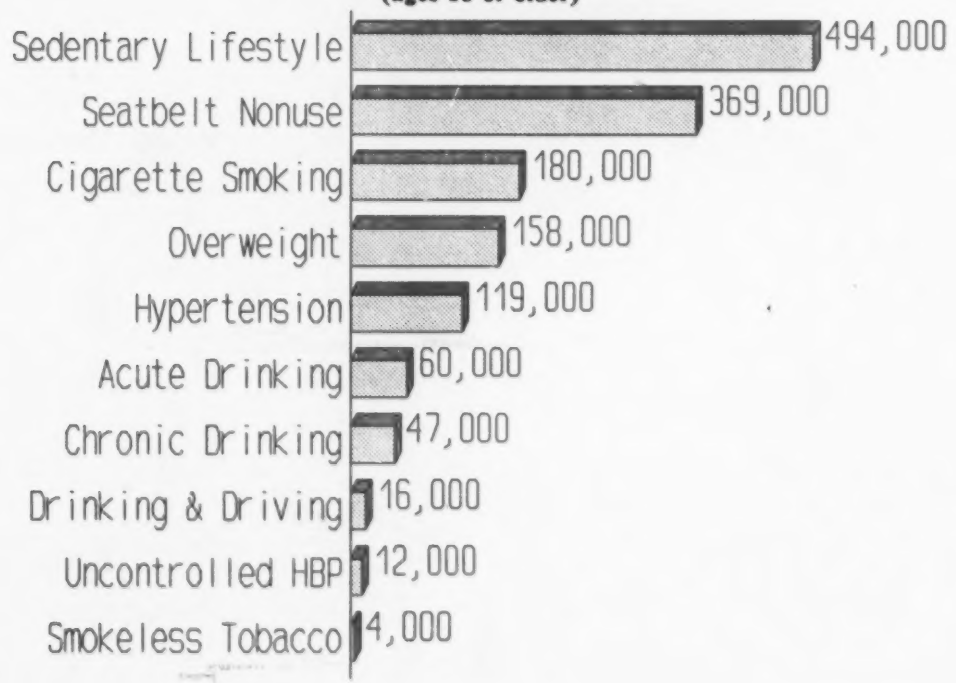
HEALTH RISKS

The focus of the BRFSS project is on lifestyles or behavioral risk factors that contribute to the major causes of death, chronic disease, and disability in Rhode Island. It is predicated on the public health model which suggests that accurate knowledge about the prevalence of certain behaviors in the population can be of value in the design and implementation of interventions to prevent illness, disability, and premature deaths.

This report contains prevalence rates for seven health risks, namely: not using seatbelts, hypertension, overweight, sedentary lifestyle, cigarette smoking, use of smokeless tobacco, and alcohol abuse. Some health risks were based on the response to a single question (e.g., smoking); while others required the answers to a series of items (e.g., sedentary lifestyle linked a physical activity with its frequency and average duration). The percentages of respondents reporting risky behaviors have been cross-tabulated using several key variables such as age, gender, and education.

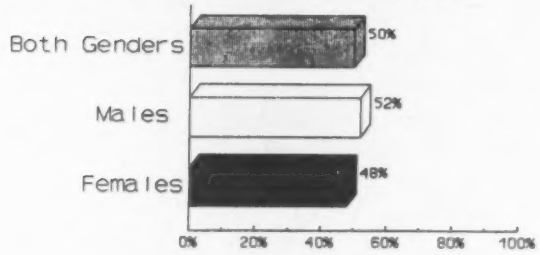
One of the strengths of the BRFSS project is that it covers a wide variety of health risks. These range from "being hypertensive and avoiding treatment" to "using smokeless tobacco." Figure 2 illustrates both the variety of health risks and their magnitude among Rhode Islanders 18 years of age or older.

Figure 2
Number of Rhode Islanders At Risk
(ages 18 or older)



SEATBELT USE

Percentage of Rhode Islanders Not Always Using Their Seatbelts*



Rhode Islanders at Risk= 369,000

*Rhode Islanders 18 years of age or older who "sometimes", "seldom", or "never" use seatbelts.

RELATED OUTCOMES:

The motor vehicle death rate in 1986 for Rhode Island was highest for males ages 15-24 at almost 50 per 100,000 population.[1]

For each year over an eight year period, more than 9,000 Rhode Islanders have suffered traffic related injuries, many of which were severe and resulted in lifelong disabilities. For example, in 1985 there were 9,131 injuries from traffic accidents.[2]

Automobile crash injuries are the leading cause of death among people from age five through thirty-four. Each year, more than one hundred Rhode Islanders die in highway crashes and many others are permanently disabled. It is estimated that more than half of these victims would have lived or at least avoided serious injury had they used safety belts.

Among adult Rhode Islanders, 50 percent infrequently or never use their seatbelts. There appears to be only a small gender gap in seatbelt use. Almost 52 percent of males were "infrequent" or "never" users; while slightly more than 48 percent of females reported this behavior. In Figure 3, those who seldom or never use seatbelts were separated into several age categories. Overall, the data show relatively little variation across age groups. Those

respondents in the 45-54 age category had the highest reported nonuse of seatbelts (56%), while those between the ages of 35-44 had the lowest percentage (44%).

Figure 3

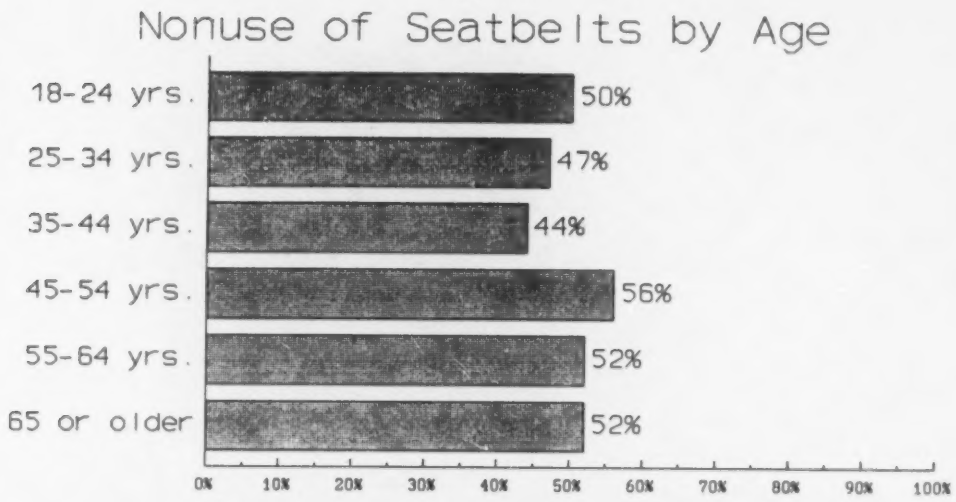
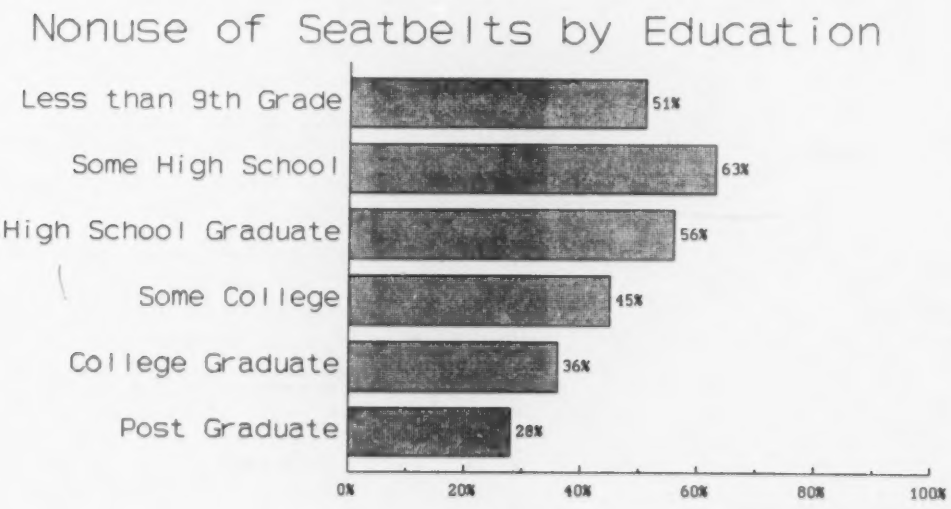


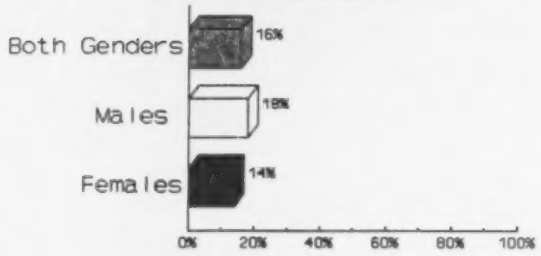
Figure 4 indicates that seatbelt use is strongly related to level of education. Only 28 percent of those with a post graduate education did not use them, compared to 63 percent of those who had only some high school. Except for the group with less than a high school education, this risk gradually declines as level of education increases.

Figure 4



HYPERTENSION

Percentage of Rhode Islanders Who Are Hypertensives



Adult Rhode Islanders at Risk= 119,000

*Rhode Islanders 18 years of age or older who report either: (1) that they have been told that their blood pressure is high more than once, (2) that they are on blood-pressure medication, or (3) their blood pressure is still high.

RELATED OUTCOMES:

If left untreated, high blood pressure can lead to stroke, heart failure, or kidney disease.

Of the 9,702 deaths in Rhode Island in 1987, hypertensive heart disease was listed as the underlying cause in 76 cases.[3]

Blacks in Rhode Island are more susceptible to hypertension and experience higher death rates for stroke than do whites.

Hypertension is the dominant risk factor for ischemic stroke. Stroke risk increases proportionately with increasing blood pressure, without a threshold level.[4]

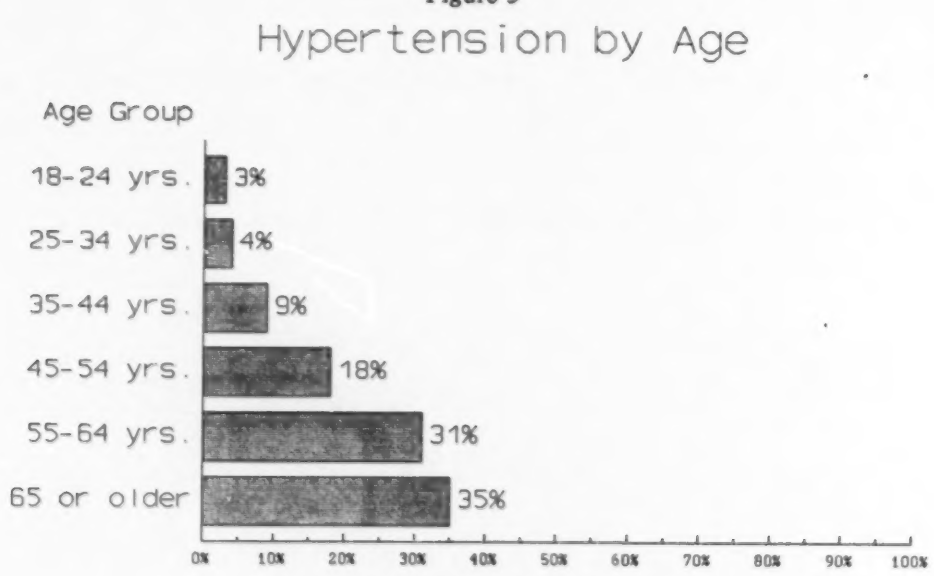
About one-half of all diabetics have a medical history of hypertension.[5]

High blood pressure or hypertension, if left untreated, can lead to stroke, heart failure, or kidney disease. Often termed the "silent killer", hypertension is asymptomatic. Furthermore, it has been repeatedly shown that, compared to individuals with normal blood pressure, those with elevated levels were much more likely to develop cardiovascular disease.

This survey found 16 percent of adult Rhode Islanders to be hypertensive. Hypertensives are defined as those respondents who: have been told more than once that their blood pressure is high; are currently taking medication for high blood pressure; or have reported that their blood pressure is still high. It should be noted that two percent of Rhode Island's adult population (about 12,000 persons) have been told that their blood pressure is elevated, and even though it remains high, are neither on medication nor following any treatment to control it. Uncontrolled hypertension continues to be the major risk for cerebrovascular disease (stroke).

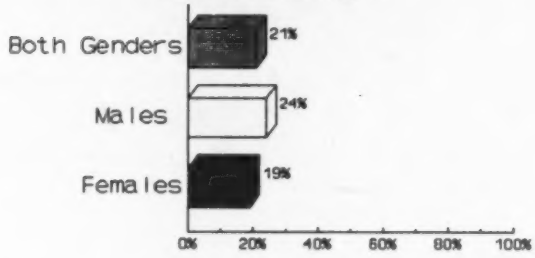
Variations in rates of hypertension across demographic characteristics show that females were at slightly higher risk than males for hypertension (18% versus 14%). Also, not surprisingly, hypertension rates increased in each successive age category (see Figure 5).

Figure 5



OVERWEIGHT

Percentage of Rhode Islanders Who are Overweight



Adult Rhode Islanders at Risk= 158,000

*Rhode Islanders 18 years of age or older who are at, or above, 120 percent of their ideal weight.

RELATED OUTCOMES:

Six million Americans suffer from diabetes. Sixty to ninety percent of type II diabetes is accompanied by obesity.[6]

In combination with obesity, the health risks of diabetes increase dramatically.[7] An estimated 35,000 Rhode Islanders have been diagnosed as diabetic, 9,000 of whom are using insulin.

In Rhode Island, cancers of white males which are strongly associated with diet or alcohol consumption, i.e., cancer of the esophagus, stomach and colon-rectum, accounted for 15.5/100,000 deaths. This level is higher than the U.S. cancer death rates in the 1970's.[8]

Obese women have higher mortality rates for cancer of the gallbladder, biliary passage, breast (postmenopausal), uterus, and ovaries than nonobese women.[9]

Weight gain and overweight are independent risks for both cardiovascular incidence and mortality. The determination that a person is overweight is neither simple nor straightfor-

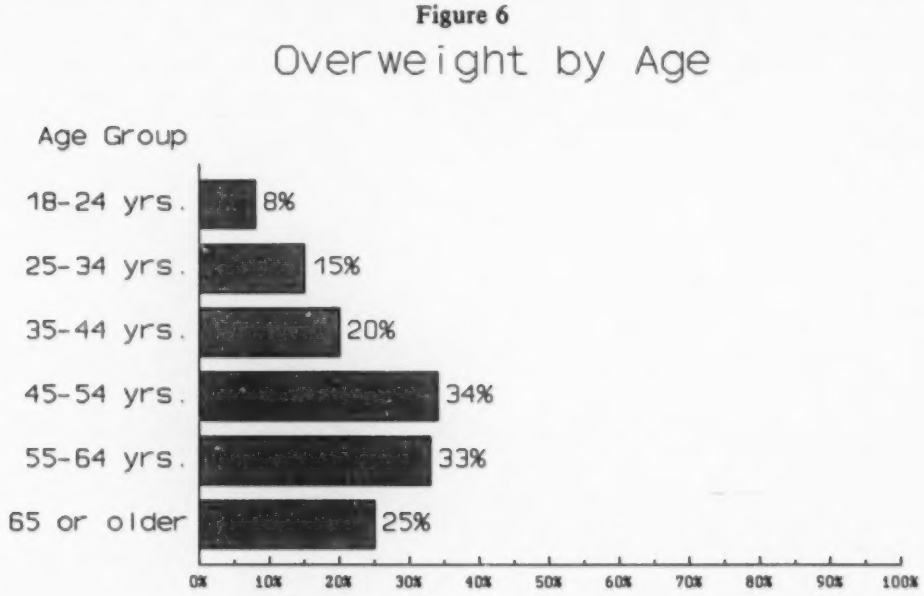
ward. CDC recommends that respondents who weigh more than 120% of the ideal weight for their height be defined as overweight. The determination is based on the respondent's height, using the mid-value for a medium-frame person. These ideal values were taken from the 1959 Metropolitan Height Weight Tables.

Differences by gender were observed on several weight related questions. For example, males were more likely to be overweight than females (24% versus 19%). On the other hand, females are more likely to report that they are now trying to lose weight (37% for females versus 23% for males). The genders also differed in the predominant method they chose to lose weight. The women were more likely to diet (86% versus 75% for men), while males were slightly more likely to increase their physical activity (60% versus 57%). (Incidentally, more women than men refused to answer the weight question.)

Differences in weight related risk were also observed across racial/ethnic groups. More black and hispanic respondents reported being overweight than did white individuals. While the racial sample was too small to determine whether these differences were statistically significant, the findings are in agreement with those of larger studies.

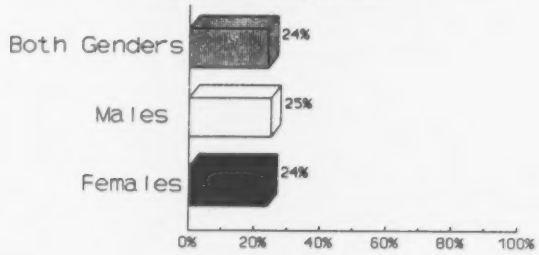
When overweight is cross-tabulated with age, a familiar pattern emerges, i.e., the proportion of overweight adults increases regularly throughout early and middle adulthood but then drops in older age. Figure 6 reveals this progression. It is interesting to note that over four times as many middle age individuals are overweight than are those in the youngest age category.

Figure 6



SMOKING

Percentage of Rhode Islanders Who Smoke Cigarettes*



Adult Rhode Islanders at Risk= 180,000

*Rhode Islanders 18 years of age or older who currently are regular smokers (that is, they have smoked at least 100 cigarettes and now smoke).

RELATED OUTCOMES:

The CDC estimated that there were 315,000 smoking-attributable deaths in the US for 1984. This included: 77,000 from coronary heart disease; 93,000 from lung cancer; and 51,000 from "chronic bronchitis", emphysema, and chronic airway obstruction.[10]

Smoking accounts for 86.7% of all lung cancer deaths, 81.8% of all chronic obstructive lung disease deaths, 21.5% of all coronary heart disease deaths, and 18% of all stroke deaths.[10]

The portion of Rhode Island deaths in 1985 that can be attributed to smoking is 163.6 per 100,000 population or 1,636 deaths.[1]

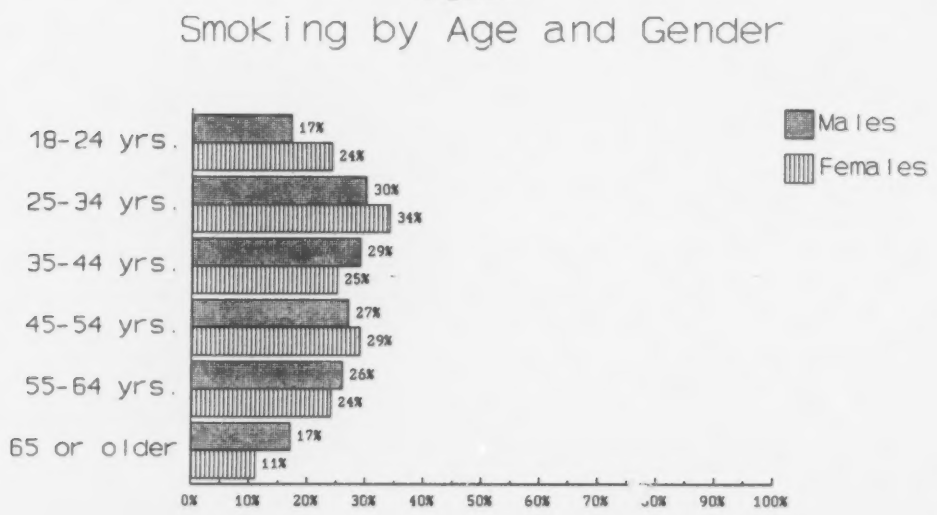
From 1970 to 1979 male death rates for lung cancer were greater in Rhode Island than the United States.[8]

Cigarette smoking is associated with increased rates of heart disease, cancer, cerebrovascular disease, and chronic obstructive pulmonary disease. This health risk continues to be

the number one preventable cause of death in the United States. It has also been linked with complications during pregnancy and with retardation in fetal growth.

In this study, individuals were considered to be cigarette smokers if they responded positively to both of the following questions: "Have you smoked at least 100 cigarettes in your life?" and "Do you smoke now?". Twenty-four percent of Rhode Islanders over 18 years of age reported that they were current smokers. Little difference was found overall between males and females (25% versus 24%). However, in Figure 7, sharp contrasts are found when comparing males and females across age groups. Young women (ages 18 to 24) are much more likely to smoke than are young men (24% versus 17%). The opposite is the case among the elderly (65 or more years of age), where more men smoke compared to women of the same age (17% versus 11%).

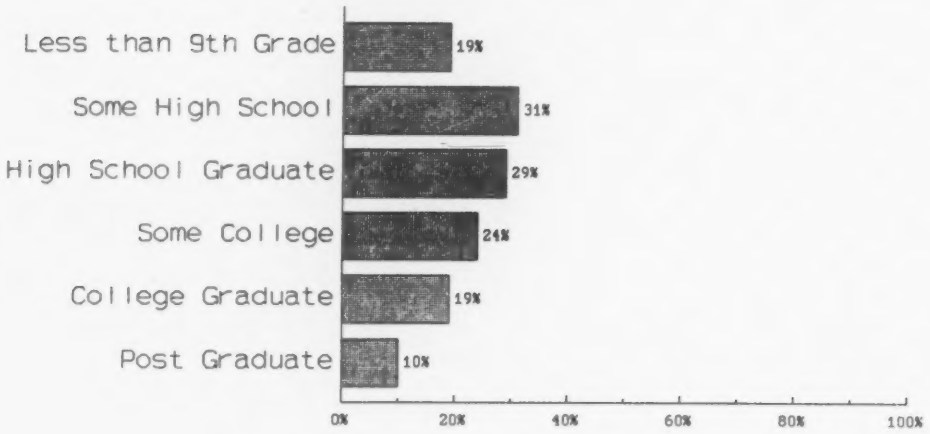
Figure 7



In general, education was negatively correlated with smoking (see Figure 8). However, the lowest education level had a very low rate of smoking. (This may simply reflect that this group is also much older.*) As the level of education increased, the rate of smoking dropped. More than three times as many respondents with "some high school" acknowledged being smokers than those who had post graduate schooling (31% versus 10%).

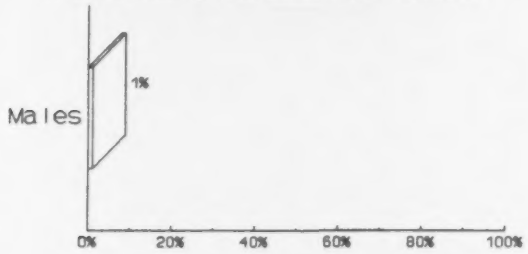
*Although the elderly population surveyed represents 23% of the sample, they comprise 68% of those who have less than a ninth grade education level.

Figure 8


Smoking by Education
Less than 9th Grade
19%
Some High School
31%
High School Graduate
29%
Some College
24%
College Graduate
19%
Post Graduate
10%
0%
20%
40%
60%
80%
100%

SMOKELESS TOBACCO

Percentage of Male Rhode Islanders Who Currently Use Smokeless Tobacco*



Male Adult Rhode Islanders at Risk= 4,000

*Rhode Island males 18 years of age or older who use smokeless tobacco (that is, snuff or chewing tobacco).

RELATED OUTCOMES:

There were at least* 62 newly diagnosed cases of oral cancer (malignant neoplasms) among Rhode Island residents in 1987. Some of these may be attributable to smokeless tobacco.[11]

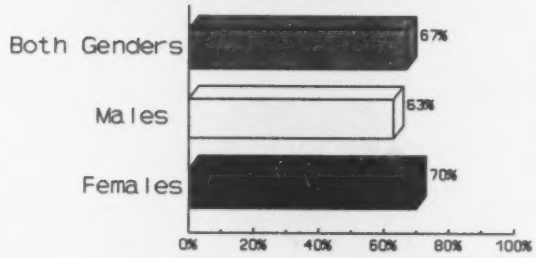
In addition to questions on cigarette smoking, respondents also were asked about their use of smokeless tobacco. Significant health risks have been associated with the use of chewing tobacco and snuff. Scientific evidence has linked smokeless tobacco use with oral cancer as well as periodontal diseases and other dental problems.

Only one half of one percent of the respondents indicated that they were currently using any smokeless product. Chewing tobacco is a predominantly male behavior with extremely few females reporting its use. In Rhode Island, the two extreme age categories, i.e., 18 to 24 (1.5%) and 65 and older (0.9%) reported the highest usage of smokeless tobacco. Data from other states generally indicate that the use of smokeless tobacco is most prevalent among male adolescents.

*Due to the reporting practices of the Rhode Island Cancer Registry, newly diagnosed cases of oral cancer were thought to be undercounted in 1987.

SEDENTARY LIFESTYLE

Percentage of Rhode Islanders Who Lead a Sedentary Lifestyle*



Adult Rhode Islanders at Risk= 494,000

*Rhode Islanders 18 years of age or older who are either sedentary or exercise only irregularly.

RELATED OUTCOMES:

Studies have shown that physical activity is inversely and causally related to the incidence of coronary heart disease.[12]

Heart disease is the leading cause of death in Rhode Island. Adjusting for age, the death rate for heart disease in Rhode Island per 100,000 population is 304.[1]

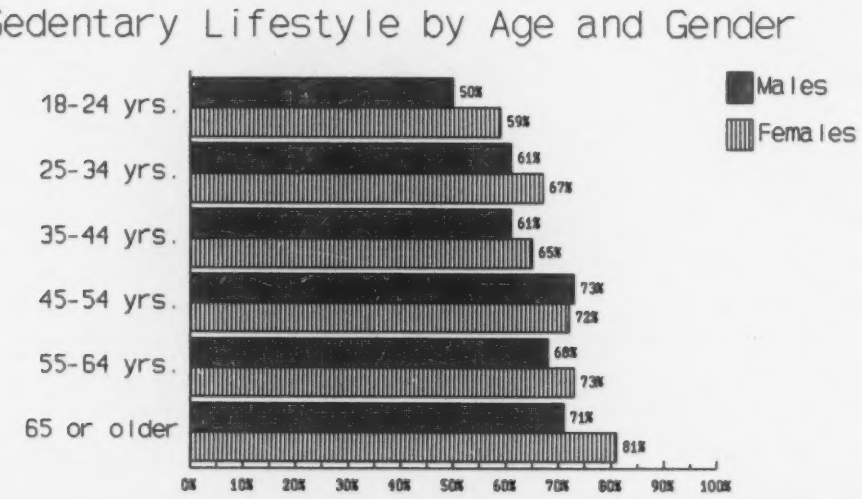
Physically active individuals are at lower risk for coronary heart disease than less active persons.[13]

A recent study by researchers at the Centers for Disease Control has determined that lack of exercise is a major risk factor for coronary heart disease. The relative risk due to a lack of physical activity is as strong as that for high serum cholesterol, high systolic blood pressure and cigarette smoking.[14] Along with the impact that exercise has on one's cardiovascular system, being physically active has many other benefits on one's overall health and well being. Exercise can help people feel better, lose weight, reduce stress, increase energy, and improve muscle strength as well as flexibility.[15]

Approximately sixty-seven percent of adult Rhode Islanders lead a sedentary life. Respondents were categorized as having a sedentary lifestyle if they reported doing less than 20 minutes of strenuous physical activity at least three times per week. This criterion is based on the "1990 Objectives for the Nation" regarding physical fitness and exercise.

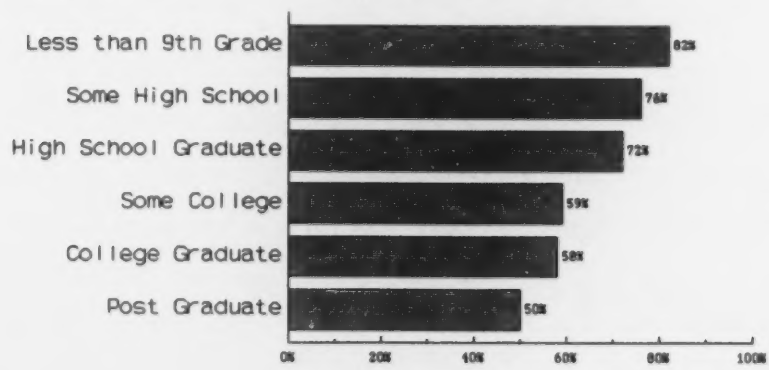
The prevalence of sedentary lifestyle is higher for females than for males (70% versus 63%). In Figure 9, it can be seen that this gender gap holds across all age categories. These data correspond with similar findings from national studies.

Figure 9



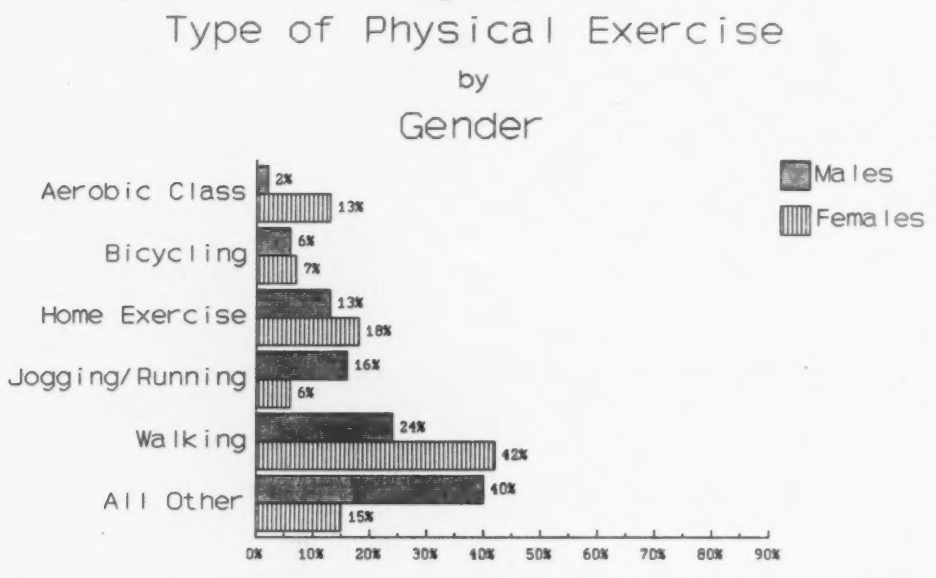
Physical activity appears to be strongly related to education. Figure 10 shows greater physical activity as educational level increases. The largest contrast is between those whose education exceeded a college degree (50% were active), versus only 18 percent for those individuals who never entered high school.

Figure 10



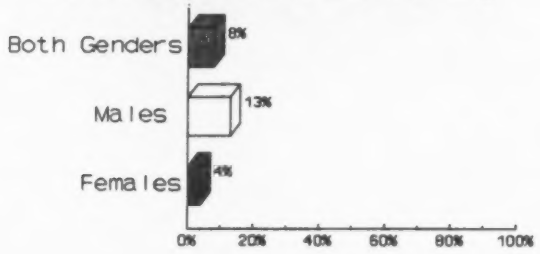
Walking, home exercise, jogging and aerobics class were found to be the most popular forms of exercise. It is interesting to note how men and women differ in the type of exercise they most often choose (see Figure 11). Walking and taking part in an aerobics class were much more likely to be the choice of females. Jogging was reported by nearly three times as many men as women.

Figure 11



ALCOHOL ABUSE:
Acute Drinking, Chronic Drinking, and Drinking and Driving

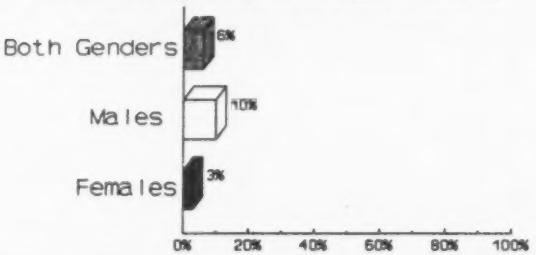
Percentage of Rhode Islanders
Who Are At Risk Due to Acute Drinking*



Adult Rhode Islanders at Risk= 60,000

*Rhode Islanders 18 years of age or older
who report having five or more drinks, on one or more occasions, last month.

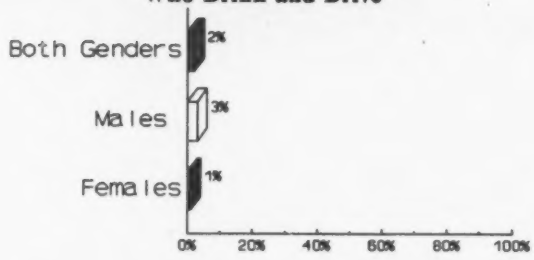
Percentage of Rhode Islanders
Who Are At Risk Due to Chronic Drinking*



Adult Rhode Islanders at Risk= 47,000

*Rhode Islanders 18 years of age or older
who report having an average of 60 or more alcoholic drinks per month.

Percentage of Rhode Islanders Who Drink and Drive



Adult Rhode Islanders at Risk= 16,000

*Rhode Islanders 18 years of age or older who admitted having driven a motor vehicle after drinking too much, on one or more occasions during the last month.

RELATED OUTCOMES:

Heavier drinkers are approximately seven times more likely to report having had a traffic accident related to alcohol than light or occasional drinkers.[16]

Almost ten times more violations for driving while intoxicated (DWI) involved heavy drinkers than light or occasional drinkers.[16]

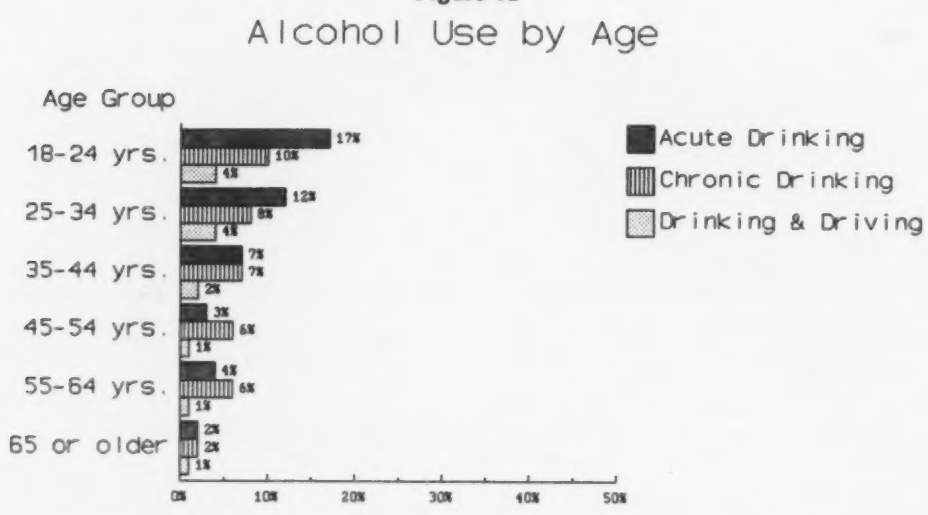
Heavy drinkers, as opposed to light or occasional drinkers, are ten times more likely to be involved in alcohol-related traffic violations and seven times more likely to experience family, marital, or work problems.[16]

The highest motor vehicle death rate in Rhode Island for 1986 was for males age 15-24 (almost 50 per 100,000 population).[1] About one-half of these deaths were related to alcohol.

Excessive alcohol consumption is associated with cancer of the: liver, esophagus and mouth. It can also lead to cirrhosis of the liver. In addition, drinking during pregnancy has been linked with fetal alcohol syndrome. Alcohol consumption is also a major factor in motor vehicle injuries and subsequent death and disabilities.[17]

Figure 12 illustrates the relationship between drinking behaviors and age. Clearly, the heaviest levels of acute drinking, chronic drinking, and drinking and driving are all found in the youngest age group.

Figure 12



Almost eight percent of adult Rhode Islanders fall into the acute drinking category. More males than females report this behavior (13% versus 4%).

Chronic drinking is reported five times more often in the 18 to 24 year old age category than the 65 and older group. Overall, six percent of adult Rhode Islanders admitted to having this problem. While this rate may appear to be small, the emotional and financial costs of this problem to individuals, their families, and to society can be considerable.

Although only 2.2% of adult Rhode Islanders report drinking and driving, this means that approximately 16,283 adults reported engaging in this dangerous activity within the last month. These figures are most likely low, since drinkers generally underreport this type of behavior. Drinking and driving declines with age. Those under thirty-five years of age are much more likely to report taking this risk than are their older counterparts (Figure 12).

COMPARISONS WITH OTHER STATES

In 1988 Rhode Island was one of 37 states that participated in the BRFSS. This cluster of states provides a basis for making rough comparisons on overall prevalence rates of health risks between adult Rhode Islanders and their counterparts in other parts of the country. However, since the 37 participating states were not selected on a random basis, any observed differences should be viewed with caution.

The prevalence of health risks related to "hypertension", "acute drinking", and "smokeless tobacco" were comparatively low in Rhode Island (see Table 2). On the other extreme, only seven of the participating states had higher rates on "sedentary lifestyle". Rhode Island's prevalence on each of the remaining health risks falls near the middle.

Table 2

Health Risks in Rhode Island Compared with Other States[a]

Health Risks[b]	R.I.'s Rank[c]	Lowest State	Rhode Island	Highest State
	no.	%	%	%
Hypertension	2	14.9	16.9	26.2
Acute Drinking	3	7.1	8.2	25.3
Smokeless Tobacco	3	0.1	0.4	9.7
Overweight	9	17.3	22.4	34.3
Drinking & Driving	11	1.4	2.6	8.8
Uncontrolled HBP	13	0.6	1.2	2.5
Chronic Drinking	18	3.3	5.8	10.8
Cigarette Smoking	19	14.7	24.3	34.2
Sedentary Lifestyle	30	45.2	64.8	73.6

[a]Prevalence rates on adult Rhode Islanders are compared with those from the 36 other states taking part in CDC's BRFSS.

[b]All of these health risks have been defined in previous sections of this report.

[c]The 37 states were ranked ordered with the state ranked first having the lowest prevalence of that health risk.

Rhode Island's relatively lower rates on major health risks should hardly be comforting given the potential harm of these behaviors. It is apparent that progress still needs to be made in several areas. The lower risk levels achieved by other states can, and should, provide realistic targets for Rhode Island.

As risk levels decrease across the nation, Rhode Island should strive not only to keep its place, but should follow the example of states that have obtained deeper reductions in health risks. Determining achievable goals will be facilitated by reports, such as this one, based on Rhode Island's Behavioral Risk Factor Surveillance System. This approach not only reveals how the state is faring, but also suggests what might be achieved.

SUMMARY

This overview of key health risks demonstrates that Rhode Islanders, not unlike other Americans, can do a great deal to improve their health and well being by changing their lifestyles. The day is past when we can rely on medical care as the sole source of continued improvement in our health. In future decades great benefits will, for the most part, only accrue to those who actively work at reducing their personal health risks.

All Rhode Islanders should be alerted to the relationship these behavioral risks have to their short and long term health. Likewise, health professionals and policy makers should bear in mind the importance of personal lifestyle choices when they consider the relative merits of health promotion/prevention activities. In the past few years Rhode Island has accomplished many of its health-risk goals, especially those related to smoking and hypertension. Significant challenges remain, particularly related to: seatbelt use, alcohol abuse, exercise, and obesity. A unified effort, consisting of personal decision-making, professional intervention, and policy/legislative change, is essential. Coordinated endeavors of this type will dramatically reduce lifestyle risks and improve the health of all Rhode Islanders.

HISTORY

In 1981, the Centers for Disease Control (CDC) enlisted several state departments of health in a coordinated telephone survey on health risk behaviors. Prior to that time, few of these organizations had been involved in collecting data on lifestyles known to be associated with preventable death. The success of CDC's 1981 survey resulted in their establishing an ongoing behavioral surveillance system, one that would be operated cooperatively with state health departments.

CDC decided to locate this new Behavioral Risk Factor Surveillance System in the health promotion or chronic disease units at the state level. This arrangement was chosen in order to facilitate the use of the survey findings in planning preventive activities.

Rhode Island has been a participant in this project since its inception; first as a test site, then in the actual implementation. In 1983 Rhode Island collected 50 interviews per month and increased this to: 70 in 1984; 120 in 1985; and 150 at the present time.

METHODOLOGY

Development of the Questionnaire

In collaboration with the participating states, CDC annually selects a core set of questions for the BRFSS survey. Most of the core items are taken from well-established national surveys. CDC also encourages states to add small modules of questions in order to capture information on issues of local concern. In order to maximize participation rates, the questionnaire is kept relatively brief. In 1987 and 1988, the average time required to conduct an interview was less than 10 minutes.

Collecting and Processing the Information

In 1985, CDC encouraged some states to utilize a multi-user computer-assisted telephone interviewing (CATI) system, in place of the paper-and-pencil recording of interview data. Unfortunately for Rhode Island, this arrangement required that the interviewers have direct access to the computer during some evenings and on weekends. Concerns about the safety of the interviewers made this arrangement impractical. Therefore, the staff of the Office of Health Promotion developed a simpler CATI system, one that would work efficiently on portable personal computers that could be operated from the homes of the interviewers. (Incidentally, this software development activity was supported for three years by special funding from CDC.)

The use of a CATI system improves the quality of the data by allowing the interviewers to move easily through complicated sets of skip patterns at their own pace, while maintaining a conversational tone with the respondent. Also, by only accepting appropriate responses, the time required for editing and coding of the data is minimized.

In Rhode Island, the monthly data sets are added to a database operated by the RIDH's Office of Health Promotion prior to sending machine-readable files to CDC. Analysis of the data is done by RIDH staff on issues of local interest; while CDC generates comparative

statistics across states.

Sample Selection

Telephone numbers are selected using the Waksberg method[18], a randomized cluster sampling technique. This procedure yields a representative sample based on all possible Rhode Island telephone numbers, including unlisted and new subscribers. Each of the selected numbers is screened (by a telephone call) and only residential phones are retained in the sample.

To maintain the representativeness of the sample, the interviewers follow rigorous procedures. For example, when an attempt to reach a number is unsuccessful because of either a "no answer" or a busy signal, that number is redialed, if necessary, up to five times per day for four days. The protocol even specifies the day of the week and time of day for each attempt. Similarly, a second effort is made to obtain an interview from those individuals who refuse initially.

Once a household is reached, a computer generated random number is used to select only one participant. To be eligible, the respondent must be a resident of Rhode Island at least 18 years of age. If the selected individual is not available, an appointment is made to conduct the interview at a later time and date. No other household member can be interviewed in place of the selected respondent.

Data Collection

The telephone interviews are conducted by individuals trained and supervised by RIDH. Each month the calls are conducted during a seven to nine day period. Shortly after all the data are collected, RIDH staff telephone a randomly selected subsample of respondents. This callback procedure has the dual purpose of verifying that the correct telephone numbers were accessed and the appropriate individuals were interviewed.

Completion Rates

The sample size for each month was 150. This yielded an overall sample for the two years of 3,550 completed interviews. To obtain this data set, a total of 8,263 telephone numbers were called resulting in a list of 6,000 eligible households. The refusal rate was 12.3 percent. An additional 27.8 percent of the attempts were unsuccessful for other reasons, such as being unable to reach the designated respondent, a busy line, or no answer. The overall response rate for 1987-88, using the Council of American Survey Research Organizations (CASRO) technique, was 69.3 percent.[19]

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REFERENCES

1 National Center for Health Statistics, Rhode Island Health Profile. U.S. Department of Health and Human Services, Public Health Service, Centers for Disease Control 1989:1-7

2 Rhode Island Department of Transportation, Planning Division, Rhode Island Highway Safety Report, September 1987.

3 Rhode Island Department of Health, The Annual Report of Vital Statistics. Office of Vital Statistics (pre-publication report) 1987.

4 Kannel WB, Wolf PA. Epidemiology of Cerebrovascular Disease. Cerebrovascular Survey Report for the National Institute of Neurological and Communicative Disorders and Stroke 1983:1-24.

5 National Diabetes Data Group. Diabetes in America, U.S. Department of Health and Human Services, Public Health Service, National Institute of Health, National Institute of Arthritis, Diabetes, Digestion and Kidney Disease. NIH Publication No.85-1468. 1985.

6 National Diabetes Data Group. Classification and Diagnosis of Diabetes Mellitus and Other Categories of Glucose Intolerance. Diabetes 1979;28:1039.

7 Lew EA, Garfinkel L. Variations in Mortality by Weight Among 75,000 Men and Women. Journal of Chronic Diseases 1979;32:563-576.

8 Fulton J, Buechner J, Baker R, Tierney J, Scott HD. Cancer in An Old Urban State. RI Medical Journal 1988 April(71)4:139-46.

9 National Institutes of Health Consensus Development Panel: National Institutes of Health Consensus Development Statement on Implications of Obesity. 1985:57-75.

10 U.S. Department of Health and Human Services: Reducing the Health Consequences of Smoking: 25 Years of Progress, A Report of the Surgeon General. Public Health Service, Centers for Disease Control, CHPE, Office on Smoking and Health. 1989. DHHS (CDC) 89-8411:117-169.

11 Rhode Island Department of Health: Cancer Rhode Island 1987. Rhode Island Department of Health, 1989.

12 Powell KE, Thompson PD, Caspersen CJ, Kendrick JS. Physical Activity and the Incidence of Coronary Heart Disease. Annual Review of Public Health 1987;8:253-87.

13 Haskell WL. Cardiovascular Benefits and Risks of Exercise: The Scientific Evidence. Sports Medicine 1984:57-75.

14 Behavioral Epidemiology and Evaluation Branch. CHPE, CDC, Protective Effect of Physical Activity on Coronary Heart Disease. MMWR 1987 July;(36)26:426-30.

15 Siscovick DS, LaPorte RE, Newman JM. The Disease-Specific Benefits and Risks of Physical Activity and Exercise. Public Health Reports 1985;100:180-8.

16 Rhode Island Department of Health. Alcohol Use in Rhode Island. Report from the 1985 Health Interview Survey 1985:1-14.

17 U.S. Department of Health and Human Services. Fifth Special Report to the U.S. Congress on Alcohol and Health from the Secretary of Health and Human Services, 1984; Pub. No. (ADM) 84-1291.

18 Waksberg J. Sampling Methods for Random Digit Dialing. Journal of the American Statistical Association, 73:3, 1978 Mar 3;73:40-47.

19 Council of American Survey Research Organizations (CASRO). (Their participation rate calculating formula apportions calls of unknown status to eligible and ineligible categories in the same proportion as exists among calls of known status.)